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☒ 1. Document ID: US 5380889 A

L1: Entry 1 of 4

File: USPT

Jan 10, 1995

US-PAT-NO: 5380889

DOCUMENT-IDENTIFIER: US 5380889 A

TITLE: Method of forming resist pattern and organic silane compound for forming anti-reflection film for use in such method

DATE-ISSUED: January 10, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hanawa; Tetsuro	Hyogo			JP
Op de Beeck; Maria	Hyogo			JP

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Mitsubishi Denki Kabushiki Kaisha	Tokyo			JP	03

APPL-NO: 07/ 814632

DATE FILED: December 30, 1991

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
JP	3-199603	August 8, 1991

INT-CL: [06] C07 F 7/10

US-CL-ISSUED: 556/410; 549/214, 528/25, 528/29, 528/129, 528/211

US-CL-CURRENT: 556/410; 430/272.1, 528/129, 528/211, 528/25, 528/29, 549/214

FIELD-OF-SEARCH: 556/410, 549/214, 528/25, 528/29, 528/129, 528/211

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4623739</u>	November 1986	Watanabe et al.	556/410
<u>4981986</u>	January 1991	Yoshioka et al.	556/410
<u>5118724</u>	June 1992	Frances et al.	556/410 X
<u>5162559</u>	November 1992	Wilharm et al.	556/410 X

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
3036710	May 1982	DE	
3627757	February 1988	DE	
3842896	November 1989	DE	

ART-UNIT: 124

PRIMARY-EXAMINER: Shaver; Paul F.

ABSTRACT:

An organic silane compound for forming an antireflection film on the surface of a substrate prior to forming a resist pattern includes a silicon atom, a leaving group bound to the silicon atom and capable of reacting with a hydroxyl group existing in the surface of the semiconductor substrate to form a covalent bond between the semiconductor substrate and the organic silane compound, and a substituent group capable of absorbing far-ultra violet light. The substrate is coated with the organic silane compound. Resist is applied onto the substrate coated with the organic silane compound. The resist is exposed selectively using far-ultra violet light. The resist is exposed.

8 Claims, 33 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	12M/C	Dram Desc	Image
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☐ 2. Document ID: US 5380621 A

L1: Entry 2 of 4

File: USPT

Jan 10, 1995

US-PAT-NO: 5380621

DOCUMENT-IDENTIFIER: US 5380621 A

TITLE: Mid and deep-UV antireflection coatings and methods for use thereof

DATE-ISSUED: January 10, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dichiara; Robert R.	Middletown	NY		
Lyons; Christopher F.	LaGrangeville	NY		
Sooriyakumaran; Ratnasabapathy	Fishkill	NY		
Spinillo; Gary T.	Wappingers Falls	NY		
Welsh; Kevin M.	Fishkill	NY		
Wood; Robert L.	Poughkeepsie	NY		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
International Business Machines Corporation	Armonk	NY				02

APPL-NO: 08/ 055400

DATE FILED: May 3, 1993

PARENT-CASE:

This application is a continuation of U.S. Ser. No. 07/845,404 filed Mar. 03, 1992, and entitled "Mid and Deep-UV Antireflection Coatings and Methods For Use Thereof, "

now abandoned.

INT-CL: [06] G03 C 1/492

US-CL-ISSUED: 430/272; 430/270, 522/6, 522/904

US-CL-CURRENT: 430/272.1; 430/270.1, 522/6, 522/904

FIELD-OF-SEARCH: 430/272, 430/270, 522/6, 522/904

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4137365</u>	January 1979	Wydeven et al.	428/412
<u>4491628</u>	January 1985	Ito et al.	430/176
<u>4515886</u>	July 1985	Yamaoka et al.	430/270
<u>4529685</u>	July 1985	Borodovsky et al.	430/311
<u>4587203</u>	May 1986	Brault et al.	430/325
<u>4623609</u>	November 1986	Harita et al.	430/325
<u>4746596</u>	May 1988	Yoshioka et al.	430/325
<u>4758305</u>	July 1988	Bonifield et al.	156/643
<u>4761464</u>	August 1988	Zeigler et al.	528/30
<u>4782009</u>	November 1988	Bolon et al.	430/326
<u>4855199</u>	August 1989	Bolon et al.	430/18
<u>4871646</u>	October 1989	Hayase et al.	430/192
<u>4910122</u>	March 1990	Arnold et al.	430/313

OTHER PUBLICATIONS

Zhang et al "Organosilane Polymers:--Diphenylsilylene--". Journal of Polymer Science, Polymer Letters Ed. vol. 23, No. 9. Sep. 1985. pp. 479-485.
R. West, "The Polysilane High Polymers", J. Organometallic Chem., 300, 327 (1986).

ART-UNIT: 157

PRIMARY-EXAMINER: McCamish; Marion E.

ASSISTANT-EXAMINER: Chapman; Mark A.

ABSTRACT:

An antireflective coating composition (ARC) for use with chemically amplified photoresist compositions comprising a polymer composition which is highly absorbent to mid and deep UV radiation, which is substantially inert to contact reactions with a chemically amplified photoresist composition, and which is insoluble in the developer for the chemically amplified photoresist composition.

7 Claims, 1 Drawing figures

Full Title Citation Front Review Classification Date Reference Sequences Attachment

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☐ 3. Document ID: US 5234990 A

L1: Entry 3 of 4

File: USPT

Aug 10, 1993

US-PAT-NO: 5234990

DOCUMENT-IDENTIFIER: US 5234990 A

TITLE: Polymers with intrinsic light-absorbing properties for anti-reflective coating applications in deep ultraviolet microlithography

DATE-ISSUED: August 10, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Flaim; Tony	St. James	MO		
Lamb, III; James	Rolla	MO		
Moeckli; Kimberly A.	Salem	MO		
Brewer; Terry	Rolla	MO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Brewer Science, Inc.	Rolla	MO			02

APPL-NO: 07/ 835715

DATE FILED: February 12, 1992

INT-CL: [05] C08J 3/00, C08K 5/36, C08L 81/00

US-CL-ISSUED: 524/609; 524/612, 524/220, 524/376, 524/221, 524/233, 524/241, 524/261, 524/284, 524/726, 524/731, 524/755, 524/770, 524/773

US-CL-CURRENT: 524/609; 430/271.1, 524/220, 524/221, 524/233, 524/241, 524/261, 524/284, 524/376, 524/612, 524/726, 524/731, 524/755, 524/770, 524/773

FIELD-OF-SEARCH: 524/609, 524/612, 524/376, 524/220, 524/221, 524/233, 524/241, 524/261, 524/284, 524/726, 524/731, 524/755, 524/770, 524/773, 528/491, 528/492, 528/493, 528/494, 528/495, 430/312, 430/313

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4910122</u>	March 1990	Arnold et al.	430/313
<u>4950583</u>	August 1990	Brewer et al.	430/311
<u>5057399</u>	October 1991	Flaim et al.	430/313
<u>5110697</u>	May 1992	Lamb, III et al.	430/14

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
0257255	February 1988	EP	

OTHER PUBLICATIONS

Ting and Liauw, "An improved Deep Ultraviolet (DUV) Multilayer Resist Process for High Resolution Lithography", SPIE Proceedings, vol. 469, p. 24 (1984).
M. A. Listvan et al., "Multiple Layer Techniques in Optical Lithography: Applications to Fine Line MOS Production", SPIE vol. 470, p. 85 (1984).
Legenza et al., "A New Class of Bilevel and Mono-level Positive Resist Systems Based on a Chemically Stable Imide Polymer", SPIE Proc., vol. 539, p. 250 (1985).
A. Jeffries et al., "Two Anti-Reflective Coatings for Use Over Highly Reflective Topography", SPIE Proceedings, vol. 539, p. 342 (1985).
W. Ishii et al., "Anti-Reflective Coating Material for Highly Reflective Surfaces

with Topography", SPIE vol. 631, p. 295 (1986).

T. Tanaka et al., "A New Photolithography Technique with Antireflective Coating on Resist: ARCOR", J. Electrochem. Soc., vol. 137, p. 3900 (1990).

A. Yen, "Fabrication of Large-Area 100 nm-Period Gratings using Achromatic Holographic Lithography", (1991).

ART-UNIT: 151

PRIMARY-EXAMINER: Michl; Paul R.

ASSISTANT-EXAMINER: Rajguru; U. K.

ABSTRACT:

A composition and a method for forming an anti-reflective layer for DUV microlithographic processes is disclosed. The compositions of the present invention includes a polymer dissolved in a suitable solvent. The polymers are polysulfone and polyurea polymers which possess inherent light absorbing properties at deep ultraviolet wavelengths. In accordance with the method of the present invention, these compositions are applied to a substrate to form an anti-reflective coating, and thereafter a photoresist material that is compatible with the anti-reflective coating is applied.

6 Claims, 0 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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☐ 4. Document ID: US 5110502 A

L1: Entry 4 of 4

File: USPT

May 5, 1992

US-PAT-NO: 5110502

DOCUMENT-IDENTIFIER: US 5110502 A

TITLE: Method of suppressing formation of contrails and solution therefor

DATE-ISSUED: May 5, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Singh; Surjit	Williamsville	NY		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
SCIPAR, Inc.	Williamsville	NY			02

APPL-NO: 07/ 234911

DATE FILED: August 22, 1988

PARENT-CASE:

This is a division of application Ser. No. 813,098 filed Dec. 24, 1985 now U.S. Pat. No. 4,766,725.

INT-CL: [05] B01D 17/02, C09K 3/18

US-CL-ISSUED: 252/319; 523/138

US-CL-CURRENT: 516/114; 523/138

FIELD-OF-SEARCH: 252/358, 252/321, 252/319, 252/70, 252/DIG.14, 239/8, 523/138,

60/204, 60/264, 60/273, 60/282

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>2835530</u>	May 1958	Schneider	239/2.1
<u>2908442</u>	October 1959	Stone	239/2
<u>2962450</u>	November 1960	Elod et al.	252/319
<u>3096290</u>	July 1963	Duane et al.	252/70
<u>3289409</u>	December 1966	Schirmer	60/205
<u>3429507</u>	February 1969	Jones	239/2
<u>3517505</u>	June 1970	Anderson et al.	60/39.5
<u>3517512</u>	June 1970	Anderson et al.	60/264
<u>3537900</u>	November 1970	Halbert	134/42
<u>3608810</u>	September 1971	Kooser	239/2
<u>3608820</u>	September 1971	Kooser	239/2
<u>3630913</u>	December 1971	Scott, Jr. et al.	252/70
<u>3647710</u>	March 1972	Stange	252/319
<u>3722815</u>	March 1973	Moore	239/2
<u>3802624</u>	April 1974	Kuhne et al.	239/2
<u>3804328</u>	April 1974	Lane et al.	239/2
<u>4176790</u>	December 1979	Osorio	239/2
<u>4335980</u>	June 1982	DePriester	405/217
<u>4358389</u>	November 1982	Konig-Lumer et al.	252/70
<u>4362271</u>	December 1982	Montmory	239/2

ART-UNIT: 123

PRIMARY-EXAMINER: Ivy; C. Warren

ASSISTANT-EXAMINER: Scalzo; Catherine S. Kilby

ABSTRACT:

A solution for suppressing the formation of contrails from the exhaust of an engine including by weight between about 0.01% to 2.5% of the non-corrosive surfactant, between about 1% and 8% water, and between about 85% and 99% ethylene glycol. Another solution may include by weight a monohydric, dihydric or polyhydric alcohol in an amount of between about 85% and 99% and the non-corrosive surfactant in an amount of between about 0.01% and 8%. Still another solution may include an inorganic nucleating or hygroscopic salt, such as ammonium iodide, ammonium fluoride, silver iodide or calcium chloride in monohydric, dihydric or polyhydric alcohols and surfactant mixtures. Yet another solution may include an inorganic salt in monohydric, dihydric or polyhydric alcohols.

26 Claims, 0 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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